Usage Examples

Development system

▶ A small system just for developing, running on any supported platform (Unix, Linux, Mac OS, Windows). This system does not need much system resources. The result can be exported and used in the production system.

Small to mid-level database server

▶ A small to mid-level database server has just small hardware requirements. PostgreSQL is not running exclusive on this system but shares the resources with other services. A webserver (Blog, CMS) with a database backend is a good example.

Large database server

▶ A large database server has extensive hardware requirements and is usually dedicated to a single application or project. PostgreSQL can use the full power of the hardware without the need to share resources.

PostgreSQL 8.3

PostgreSQL 8.3, released in early 2008, includes a record number of new and improved features which will greatly enhance PostgreSQL for application designers, database administrators, and users, with more than 280 patches by dozens of PostgreSQL contributors from 18 countries.

Version 8.3 provides greater consistency of performance than previous versions, ensuring that every user can depend on the same high performance demonstrated in recent benchmarks for every transaction, whether in peak hours or not, seven days a week, 52 weeks per year. Major enhancements include:

▶ *Heap Only Tuples (HOT)*
▶ *Spread checkpoints*
▶ *Automated self-tuning of the background writer*
▶ *Asynchronous commit option*
▶ *Synchronized Scans*
▶ *ANSI-standard SQL/XML support, incl. XML export*
▶ *Text search: Tsearch2*
▶ *GSSAPI and SSPI authentication support*
▶ *New data types: UUIDs, ENUMs and arrays of composite types*
▶ *SNMP support*

Further Information

PostgreSQL (2nd Edition), Korry Douglas, Sams Publishing, ISBN: 0672327562

Beginning Databases with PostgreSQL:From Novice to Professional, Second Edition, Neil Matthew, Apress, ISBN: 1590594789

PostgreSQL Developer's Handbook, Ewald Geschwinde, Sams Publishing, ISBN 0672322609

Beginning PHP and PostgreSQL 8, W. Jason Gilmore, Apress, ISBN 1590595475

PHP and PostgreSQL Advanced Web Programming, Ewald Geschwinde and Robert Treat, Sams Publishing, ISBN 0672323826

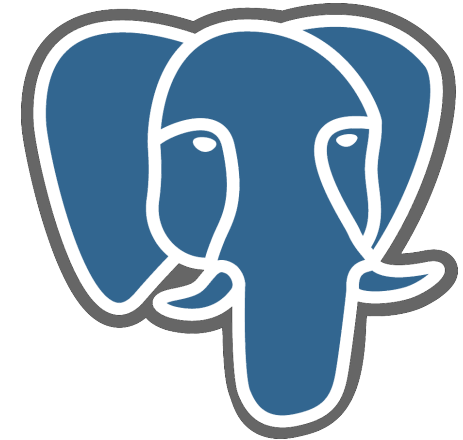PostgreSQL homepage: www.postgresql.org

pgAdmin III: http://www.pgadmin.org

PgFoundry: http://pgfoundry.org

phpPgAdmin: http://phppgadmin.sourceforge.net

PostGIS: postgis.refractions.net

Slony: slony.info

Space for Advertising

PostgreSQL

What is PostgreSQL?

PostgreSQL is an object-relational database management system (ORDBMS). It is freely available and usable without licensing fee. PostgreSQL was originally developed at the University of California and uses the simple BSD-license.

It is a very advanced database system in the open source area. PostgreSQL supports most parts of the SQL2003 standards and has a variety of its own extensions.

Users can extend the system with self-defined data types, operators and functions. Apart from support for referential integrity and an advanced transaction management, PostgreSQL also offers definition of triggers and rules to control access to database objects.

What does PostgreSQL offer?

▶ PostgreSQL supports the ANSI-SQL-Standard SQL92. Of the 5 categories of the SQL99 standard, Framework, Foundation, Call Level Interface, Persistent Stored Modules and Host Language Bindings are implemented in the categories 1, 2 and 5. Moreover PostgreSQL offers, among many of its own extensions, support for geometric data types (PostGIS).

- *Language Scope:* Mass operations on one or multiple tables are possible with PostgreSQL just as operations with Subselects, Outer Joins (the Full Outer Join too) or Views.
- *Referential Integrity:* Tables can be referenced with the definition of primary and foreign keys. This way the relations between tables is represented in the database and checked for correctness automatically.
- *Transactions:* PostgreSQL is ACID compliant while using Multi Version Concurrency Control (MVCC). In PostgreSQL read access never has to wait for write access and vice versa. Also there are Two-phase-commits and Savepoints.
- *Concurrently Online Index Builds:* Indices could be created, without locking the table. During index creation competing INSERTs, UPDATEs und DELETEs are possible.
- *Triggers*: In PostgreSQL 'Before' or 'After' triggers on row or statement level are implemented.
- *Programming:* offers interfaces for ODBC and JDBC as well as interfaces to many programming languages like PHP (native, PDO), Perl (DBI), C (libpq), Python (psycopg, pyPgSQL), Ruby, ...
- *Stored Procedures*: These are functions written in different server side programming languages, i.e. SQL or PostgreSQL procedural languages like PL/pgSQL. They are compiled and directly stored in the database server, making them very fast.
- *Object-relational Characteristics:* PostgreSQL allows the storage of non-atomic data types in arrays or geometric data types. Both are extensions of PostgreSQL not found in the SQL standard. All database objects, whether they are tables, views, sequences or single data sets, have their own object identity. Apart from that inheritance from table characteristics to derived child tables is supported.
- *Extendability:* The type system is extensible by custom data types, operators and functions, making the system individually customizable. Functions can be written in SQL or other procedural languages. With PL/pgSQL you have your own procedural language at your disposal.
- *Large Objects*: Binary data, like audio, video or images, can be stored in tables.
- *Rules*: The rule system allows to define alternate actions performed on insertions, updates or deletes.
- *GIN – Generalized Inverted Index:* Index structure storing a set of *(key, documentlist)* tuples whereas *documentlist* means a set of data in which a certain field contains *key*. Invers means not the primary key for referencing a record is stored, but expressions that are contain in the field itself.

- *GiST*: Generalized Search Trees provide the possibility to create custom data types with indexed access methods.
- *Character Set:* PostgreSQL understands many international character sets, Multibyte-Encoding is standard and allows EUC or Unicode.
- *SSL*: communication between client and server may be encrypted with SSL.
- *Kerberos Authentication:* Kerberos is a protocol for network authentication. It has been developed specifically for secure Client-Server -communication and can be compiled into PostgreSQL directly.
- *Operation:* PostgreSQL makes extensive use of multiple processors or cores, supports replication with "Slony" and offers the user the choice of table spaces and Point-In-Time recovery.
- *Clustering und Loadbalancing*: The software 'PG-Cluster' offers all the clustering load balancing features for PostgreSQL.
- *Tablespaces*: allows alternate locations for database objects on the file system (as example on a RAID system)
- *Warm Standby Log Shipping:* The continuous archiving of transaction logs (PITR) makes high availability solutions with one or more standby servers possible. In case of a failure of the main server the standby servers can take over.
- *Full Text Search*: Available as an extension called Tsearch2 since PostgreSQL version 7.3. It is very flexible and supports stop words, dictionary mapping of synonyms or phrases, stemming rules, indexes, search result ranking and highlighting and more. Tsearch2 is fully integrated into PostgreSQL from version 8.3 upwards.

Technical Data

Parameter	Value
Maximal size of database	Unlimited
Maximal size of table	16 Terabyte, 32 Terabyte with Version 8
Maximal size of row	1,6 Terabyte
Maximal size of field	1 Gigabyte
Maximal number of rows in DB	Unlimited, the file system is the limiting factor
Maximal number of columns	250 to 1600, depending on the column type
Maximal size of indices in table	Unlimited

Software for PostgreSQL

System software

- *PGCluster* (Loadbalancing and Clustering) – Features: synchronous, replication on table level, multi-master, two or more database servers can simultaneously serve client requests, replication on demand, sent within a group of server, replication of sequences and large objects, serial data types are synchronized.
- *Slony (Replication)* – Features: asynchronous mode, single master to multiple slaves, slaves can be cascaded, uses triggers, replication on table level, no exclusive locks necessary, can replicate schema changes, all tables require a primary keys, all nodes in the network need to be available at all times, cannot replicate large objects, no automatic failover.

Administration

- *pgAdmin*: Extensive graphical tool for administration that should fulfill nearly all wishes. It stands out with its ease-of-use and clearly arranged display of the database structure.
- *phpPgAdmin*: A PHP-based web interface that can be used with the browser of any operating system.

Client software for PostgreSQL

- *ERP/CRM*: Compiere, SQL-Ledger, TinyERP, Xtuples
- *Connectivity*: ODBC/JDBC-driver, Ruby-, Python, Perl- and Tcl-Bindings, C/C++-Libraries, Qt-Plugin, Npgsql.NET, PG Win32 Client (pgOleDB and psqlODBC)
- *Stored Languages*: pl/Ruby, pl/Python, pl/Perl, pl/Java, pl/PHP, pl/sh, pl/R, pl/scheme
- *Connectivity*: DBI-Link, Oralink, odbclink
- *Groupware*: OpenGroupware, various POP3/IMAP-server
- *Office*: OpenOffice, StarOffice
- *CMS/Shop-Systeme*: LivingShop, XIST4C
- *Image Database*: gPictureBase, Gallery2
- *Blog Software*: Serendipity
- *Board Software*: phpBB3
- *Wiki Software*: Mediawiki
- *Bugtracking/CRM*: JIRA
- *Search*: ht://miner, Tsearch2
- *Games*: Poker Tracker, FlightGear